

**FULL VERSION OF PENDING CLAIMS**

1       Claim 1 (Currently Amended): A baked carbonaceous refractory material, produced  
2       by baking in a non-oxidizing atmosphere, containing 50 to 85% by mass of carbon, 5 to 15%  
3       by mass of a refractory metal oxide alumina, 5 to 15% by mass of metallic silicon, and 5 to  
4       20% by mass in total of at least one selected from the group consisting of metallic titanium,  
5       titanium carbide, titanium nitride and titanium carbonitride  $TiC_xN_y$ , where  $0 < x, y < 1$  and  $x +$   
6        $y = 1$ ,

7 where the X-ray diffraction peak intensity ratio of the face (200) of the  $Ti_3O_5$   
8 to the face (111) of titanium carbide is 1% or less.

1       Claim 2 (Currently Amended): A method for producing a baked carbonaceous  
2       refractory material by compounding 50 to 85% by mass of carbonaceous materials, as main  
3       raw materials, which are calcined anthracite, calcined coke, natural graphite, artificial  
4       graphite or these mixture, with 5 to 15% by mass of a refractory metal oxide alumina, 5 to  
5       15% by mass of metallic silicon and 5 to 20% by mass in total of at least one selected from  
6       the group consisting of metallic titanium, titanium carbide, titanium nitride, and titanium  
7       carbonitride  $TiC_xN_y$ , where  $0 < x, y < 1$  and  $x + y = 1$ , and by adding organic binder to the  
8       mixture, then kneading, forming and baking in non-oxidation atmosphere to obtain the  
9       carbonaceous refractory materials in the first claim,

where the X-ray diffraction peak intensity ratio of the face (200) of the  $Ti_3O_5$  to the face (111) of titanium carbide is 1% or less.

1       Claim 3 (Currently Amended): The baked carbonaceous refractory material of claim  
2       1, where the refractory metal oxide contains at least one selected from the group consisting of  
3       alumina, zircon, magnesia, mullite, spinel and silica.

4  
1       Claim 4 (Currently Amended): The method of producing the baked carbonaceous  
2       refractory material of claim 2, where the refractory metal oxide contains at least one selected  
3       from the group consisting of alumina, zircon, magnesia, mullite, spinel and silica.

D1      1       Claim 6 (Cancelled)

1       Claim 7 (Currently Amended): The baked carbonaceous refractory material of claim  
2       1,

3               wherein the 5 to 20% by mass in total of at least one selected from the group  
4       consisting of metallic titanium, titanium carbide, titanium nitride and titanium carbonitride  
5        $TiC_xN_y$ , where  $0 < x, y < 1$  and  $x + y = 1$ , a predetermined small amount of the titanium  
6       dissolves and enables the formation of a high melting point protective layer bound to the  
7       carbonaceous refractory material.

1       Claim 8 (Currently Amended): The method of producing the baked carbonaceous  
2       refractory material of claim 2,

3               wherein the 5 to 20% by mass in total of at least one selected from the group  
4       consisting of metallic titanium, titanium carbide, titanium nitride and titanium carbonitride  
5        $TiC_xN_y$ , where  $0 < x, y < 1$  and  $x + y = 1$ , a predetermined small amount of the titanium  
6       dissolves and enables the formation of a high melting point protective layer is formed in the  
7       proximity of on the carbonaceous refractory material surface.

1       Claim 9 (Currently Amended): An improved A durable carbonaceous refractory  
2       material, produced by baking in a non-oxidizing atmosphere, for lining the side walls and

3 bottom region of a blast furnace hearth, the ~~improved~~ durable carbonaceous refractory  
4 material having a reduced carburization dissolution rate and an increased wettability with  
5 molten iron to yield excellent corrosion resistance properties, ~~the improvement~~ consisting  
6 essentially of:

7 50 to 85% by mass of carbon;

8 5 to 15% by mass of a refractory metal oxide, ~~the refractory metal oxide~~  
9 *100% Crust* contains at least one selected from the group consisting of alumina, zircon, magnesia, mullite,  
10 spinel and silica, the refractory metal oxide being present in a sufficient amount to form a  
11 residual refractory metal oxide layer ~~in proximity to~~ on the surface of the carbonaceous  
12 refractory materials even after dissolution of the carbon aggregates and to stay between the  
13 carbonaceous refractory material and molten iron to prevent the contact between the  
14 carbonaceous refractory material and the molten iron, thereby reducing the consumption of  
15 the carbonaceous refractory materials;

16 5 to 15% by mass of metallic silicon; and

17 5 to 20% by mass in total of at least one metallic titanium or titanium  
18 compound selected from the group consisting of metallic titanium Ti, titanium carbide TiC,  
19 titanium nitride TiN, titanium carbonitride  $TiC_{0.7}N_{0.3}$ , and titanium carbonitride  $TiC_{0.3}N_{0.7}$ ,

20 the metallic titanium or titanium compound being present in an amount to  
21 sufficiently cover the whole surface of the carbonaceous refractory material which is not  
22 sufficiently supplied by the residual refractory metal oxide layer after the dissolution of the  
23 carbon aggregate, such that a durable and economical covering layer is formed on the  
24 carbonaceous refractory material surface, the metallic titanium or titanium compound  
25 allowing improved wettability with molten iron,

26 wherein the X-ray diffraction peak intensity ratio of the face (200) of the  
27  $Ti_3O_5$  to the face (111) of titanium carbide is 1% or less.

1       Claim 10 (Currently Amended): The ~~improved~~ durable carbonaceous refractory  
2       material of Claim 9,  
3                wherein the particle size of the refractory metal oxide being sized in the range  
4       of ~~approximately~~ 2  $\mu\text{m}$  to 3  $\mu\text{m}$ .

1       Claim 11 (Currently Amended): The ~~improved~~ durable carbonaceous refractory  
2       material of Claim 9,  
3                wherein the particle size of the metallic silicon being sized in the range of  
4       ~~approximately~~ 1  $\mu\text{m}$  to 74  $\mu\text{m}$ .

1       Claim 12 (Currently Amended): The ~~improved~~ durable carbonaceous refractory  
2       material of Claim 9,  
3                wherein the particle size of the metallic titanium and titanium compounds  
4       ~~being sized approximately is~~ 7  $\mu\text{m}$ .

1       Claim 13 (New): A durable carbonaceous refractory material, produced by baking in  
2       a non-oxidizing atmosphere, for lining the side walls and bottom region of a blast furnace  
3       hearth, the ~~improved~~ durable carbonaceous refractory material having a reduced carburization  
4       dissolution rate and an increased wettability with molten iron to yield excellent corrosion  
5       resistance properties, consisting essentially of:

6               50 to 85% by mass of carbon;  
7               5 to 15% by mass of a refractory metal oxide selected from the group  
8       consisting of alumina, zircon, magnesia, mullite, spinel and silica, the refractory metal oxide  
9       being present in a sufficient amount to form a residual refractory metal oxide layer on the  
10      surface of the carbonaceous refractory materials even after dissolution of the carbon  
11      aggregates and to stay between the carbonaceous refractory material and molten iron to  
12      prevent the contact between the carbonaceous refractory material and the molten iron,

13 thereby reducing the consumption of the carbonaceous refractory materials;

14 greater than 6 to 15% by mass of metallic silicon; and

15 5 to 20% by mass in total of at least one metallic titanium or titanium

16 compound selected from the group consisting of metallic titanium Ti, titanium carbide TiC,

17 titanium nitride TiN, titanium carbonitride  $TiC_{0.7}N_{0.3}$ , and titanium carbonitride  $TiC_{0.3}N_{0.7}$ ,

18 the metallic titanium or titanium compound being present in an amount to

19 sufficiently cover the whole surface of the carbonaceous refractory material which is not

20 sufficiently supplied by the residual refractory metal oxide layer after the dissolution of the

21 carbon aggregate, such that a durable and economical covering layer is formed, the metallic

22 titanium or titanium compound allowing improved wettability with molten iron,

23 wherein the X-ray diffraction peak intensity ratio of the face (200) of the

24  $Ti_3O_5$  to the face (111) of titanium carbide is 1% or less.

1 Claim 14 (New): A method for producing a baked carbonaceous refractory material

2 by compounding 50 to 85% by mass of carbonaceous materials, as main raw materials, which

3 are calcined anthracite, calcined coke, natural graphite, artificial graphite or these mixture,

4 with 5 to 15% by mass of a refractory metal oxide alumina, greater than 6 to 15% by mass of

5 metallic silicon and 5 to 20% by mass in total of at least one selected from the group

6 consisting of metallic titanium, titanium carbide, titanium nitride, and titanium carbonitride

7  $TiC_xN_y$ , where  $0 < x, y < 1$  and  $x + y = 1$ , and by adding organic binder to the mixture, then

8 kneading, forming and baking in non-oxidation atmosphere to obtain the carbonaceous

9 refractory materials in the first claim,

10 where the X-ray diffraction peak intensity ratio of the face (200) of the  $Ti_3O_5$

11 to the face (111) of titanium carbide is 1% or less.